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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,141	04/01/2004	Heung-Lyu  Cho	0630-1979P	6546
2292 7590 06/06/2007 BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			EXAMINER SCHECHTER, ANDREW M	
			ART UNIT 2871	PAPER NUMBER
			NOTIFICATION DATE 06/06/2007	DELIVERY MODE ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

## Office Action Summary

Application No.

10/814,141

Applicant(s)

CHO ET AL.

Examiner

Andrew Schechter

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 15-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-4, 15 and 16 is/are allowed.
- 6) ☒ Claim(s) 17-19 is/are rejected.
- 7) ☒ Claim(s) 20 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Request for Continued Examination***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 18 October 2006 has been entered.

### ***Response to Arguments***

2. Applicant's arguments filed 18 October 2006 have been fully considered.

Regarding claim 1, the applicant argues [pp. 6-7] that *Yudasaka* does not teach using an inkjet process specifically for applying a contact hole photoresist pattern by printing, to form a contact hole in a passivation layer. That is, while *Yudasaka* does disclose applying photoresist patterns by printing to pattern insulating layers, and gives a general teaching for the benefits of this, *Yudasaka* does not specifically mention forming a contact hole in a passivation layer. This appears to be correct. *Yudasaka* teaches patterning insulating layers in this manner [col. 20, lines 27-34, for instance], but does not specifically refer to forming a contact hole in an insulating layer in this manner. (*Yudasaka*'s one explicit reference to forming a contact hole gives a slightly different technique: "pattern-coating" the insulating film directly to have a contact hole,

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rather than pattern-forming a resist with a contact hole on top of the insulating film and then using the patterned resist to etch the insulating film [col. 8, lines 46-50]; the examiner notes that this is merely a different teaching, not a "teaching away".) The applicant then argues that therefore the combination of references in the rejection does not disclose all the features. This argument is only partially persuasive to the examiner. *Holmberg* does disclose a passivation (insulating) layer patterned to have a contact hole; *Yudasaka* does teach patterning such insulating layers using the recited printing technique. All the features are therefore disclosed or suggested by the prior art. However, since *Yudasaka*'s motivation is to save resist material and avoid costly photolithography, the examiner believes that *Yudasaka* is effective to teach using this technique to pattern contact holes in insulating layer *when there are no other photolithographic steps in the process*; otherwise the question of when to use each technique arises, and *Yudasaka* does not address this. Thus, the examiner withdraws the previous rejection of claim 1 over *Yudasaka*, and does not apply *Yudasaka*'s teaching to new claims 20 and 21, which recite multiple patterning techniques, but the examiner does reject new claims 17-19 over *Yudasaka*, as they only recite using the printing technique taught by *Yudasaka*.

The only prior art references known to the examiner which do specifically disclose or suggest printing a photoresist pattern for patterning a contact hole in an insulating layer are *Baek et al.*, US 2003/0219920 and *Baek et al.*, US 2004/0121614, both discussed below.

The applicant argues [p. 7] that *Yudasaka* uses a coating process to form the source/drain region of the silicon film, thereby teaches away from the use of a conventional (photolithography) mask to form the same as suggested by *Mori*. This is not persuasive. The source/drain region of the silicon film is equivalent to the “active region” of the claims, which the applicant also forms by printing the resist. It is the source/drain electrodes which are patterned (in the claimed invention) by conventional photolithography, not the source/drain region of the silicon. Thus, there is no conflict between the references in this regard, and certainly no “teaching away” on this matter. Regardless, this point is moot in view of the new grounds of rejection.

### ***Claim Objections***

3. Claim 21 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claim 21 has not been further treated on the merits.

The examiner suggests that “through out the method of claim 17” could be replaced with “during the steps of forming a gate line on a substrate, forming a gate insulating layer ... and forming a pixel electrode on the passivation layer by printing a pixel electrode photoresist pattern”, thus eliminating the multiple dependency problem.

4. Claim 17 is objected to because of the following informalities: “contact hole over the passivation layer” should be “contact hole in the passivation layer”. Appropriate correction is required.

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5. Claim 1 is objected to because of the following informalities: "contact hole over the passivation layer" should be "contact hole in the passivation layer". Appropriate correction is required.

6. Claim 17 is objected to because of the following informalities: "an active region over the impurity-doped layer" should be "an active region including the impurity-doped layer" or similar, since it is the resist for patterning the active region which is over the impurity-doped layer, not the active region itself. Appropriate correction is required.

7. Claim 1 is objected to because of the following informalities: "an active region over the high-concentrated N+ layer" should be "an active region including the high-concentrated N+ layer" or similar, since it is the resist for patterning the active region which is over the impurity-doped layer, not the active region itself. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 17-19 are rejected under 35 U.S.C. 102(e) as being anticipated by *Baek et al.*, US 2003/0219920.

[The applied reference has a common inventor and assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.]

[Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.]

*Baek* discloses [see Fig. 5, for instance] a method for forming a liquid crystal display device, comprising forming a gate line [223] on a substrate [200]; forming a gate insulating layer [222], a semiconductor layer [228a], and an impurity-doped layer [228b] over the gate line; forming an active region over the impurity-doped layer [see Fig. 5C-D], forming a source electrode [225a] and a drain electrode [225b] over the active region], forming a passivation layer [229] over the source and drain electrodes, forming a contact hole [230] over (in) the passivation layer by applying a contact hole photoresist pattern [250f] by printing [see paragraph 0041], and forming a pixel electrode [231] on the passivation layer by printing a pixel electrode photoresist pattern [250g, see paragraph 0042]. Claim 17 is therefore anticipated.

The step of forming the gate line includes applying a gate photoresist pattern [250a] on the substrate by printing [see paragraph 0035], so claim 18 is anticipated as

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well. The step of forming the active region including applying an active photoresist pattern [250b-d] over the impurity-doped layer by printing, so claim 19 is also anticipated.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Holmberg et al.*, U.S. Patent No. 6,160,270 in view of *Yudasaka et al.*, U.S. Patent No. 5,989,945.

*Holmberg* discloses [see Fig. 6, for instance] a fabrication method of an LCD, comprising forming a gate line [132, etc.] on a substrate [122], forming a gate insulating layer [138], a semiconductor layer [140], and an impurity-doped layer [142] over the gate line; forming an active region over the impurity-doped layer; forming source and drain electrodes [152, 154] over the active region; forming a passivation layer [160] over the source and drain electrodes; forming a contact hole [164] over (in) the passivation layer by applying a contact hole photoresist pattern [162]; and forming a pixel electrode [168] on the passivation layer by depositing a pixel electrode photoresist pattern [170].



*Holmberg* does not disclose that the contact hole and pixel electrode photoresist patterns are formed by printing. *Yudasaka* does disclose [col. 19, lines 47ff.] forming such photoresist patterns by ink jet printing, and teaches that using doing "increases utilization of the solution and permits forming a patterned coating film ...[and] drastically reduces initial investment and production cost of a liquid crystal display device" [abstract]. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use ink jet printing to form the contact hole photoresist pattern and the pixel electrode photoresist pattern. Claim 17 is therefore unpatentable.

*Holmberg* discloses applying a gate photoresist pattern [130] and applying an active photoresist pattern [144] over the impurity-doped layer, but does not disclose that either are formed by printing. As above, *Yudasaka* discloses making such patterns by printing, and it would have been obvious to one of ordinary skill in the art at the time of the invention for the reasons given above. Claims 18 and 19 are therefore unpatentable as well.

#### ***Allowable Subject Matter***

12. Claims 20 and 21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Claims 1-4, 15, and 16 are allowed.

14. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose the method of claim 20, in particular that the contact hole and pixel electrode resists are patterned by printing, while the source/drain resist is a photoresist patterned using a mask. Claim 20 would therefore be allowable if rewritten appropriately, as would its dependent claim 21 (if corrected appropriately).

Please note, however, the objection above to claims 17, 20, and 21.

The prior art does not disclose the method of claim 17, in particular that the gate line resist, the active region resist, the contact hole resist, and the pixel electrode resist are all patterned by printing, while the source/drain electrode resist is formed by a lithography process using a mask. For example, *Baek* discloses using either all mask photolithography [see Fig. 3] or all resist printing [see Fig. 5], but not the recited mix of method steps. Claim 1 is therefore allowed, as are its dependent claims 2-4, 15, and 16.

Please note, however, the objection above to claim 1.

The examiner notes that the term "photoresist" used for a resist patterned by printing is something of a misnomer, since the resist is explicitly not patterned photolithographically. However, the examiner does not believe this creates unnecessary confusion in the context of these claims.

### ***Election/Restrictions***

15. Claim 17 is allowable. The restriction requirement between species A1 and A2, as set forth in the Office action mailed on 9 February 2007, has been reconsidered in view of the allowability of claims to the elected invention pursuant to MPEP § 821.04(a).

**The restriction requirement is hereby withdrawn as to any claim that requires all the limitations of an allowable claim.** Claim 16, directed to species A2, is no longer withdrawn from consideration because the claim(s) requires all the limitations of an allowable claim.

In view of the above noted withdrawal of the restriction requirement, applicant is advised that if any claim presented in a continuation or divisional application is anticipated by, or includes all the limitations of, a claim that is allowable in the present application, such claim may be subject to provisional statutory and/or nonstatutory double patenting rejections over the claims of the instant application.

Once a restriction requirement is withdrawn, the provisions of 35 U.S.C. 121 are no longer applicable. See *In re Ziegler*, 443 F.2d 1211, 1215, 170 USPQ 129, 131-32 (CCPA 1971). See also MPEP § 804.01.

### **Conclusion**


16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 2004/0121614 to *Baek et al.* discloses [see Fig. 7] a printing method for applying a resist to pattern a contact hole in a passivation layer. This reference is commonly assigned, has overlapping inventors, and is an intervening 102(e) reference only (not a 102(a) reference).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

  
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3 February 2007